

## EXHIBIT E – CLAIM 1 OF THE '765 Patent

<p>1. A method of handling uplink synchronization for a mobile device capable of receiving and transmitting on a plurality of component carriers in a wireless communication system, the method comprising:</p>	<p>To the extent the preamble is limiting, Volkswagen's cars include telematics modules that practice this limitation. For example, the telematics modules and related communications technology in the car implement the following standards which practice the claimed invention:</p> <p>[1] TS 36.300 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA) and Evolved Terrestrial Radio Access Network (E-UTRAN); Overall description (Release 11), v 11.14.0 (2015-12)</p> <p>[2] TS 36.321 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (Release 11), v 11.6.0 (2015-03)</p> <p>In particular, for example, the uplink procedures set forth in 3GPP standard TS 36.300 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA) and Evolved Terrestrial Radio Access Network (E-UTRAN); Overall description (Release 11), v 11.14.0 (2015-12), provides for uplink synchronization as follows:</p> <p>10.1 Intra E-UTRAN</p>
<p>performing a first random access procedure on a first component carrier of the plurality of component carriers to establish uplink synchronization on the first component carrier; and</p>	<p>This limitation is present in the Accused Products. For example, 3GPP standard TS 36.300 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA) and Evolved Terrestrial Radio Access Network (E-UTRAN); Overall description (Release 11), v 11.14.0 (2015-12) describes performing a first random access procedure in the manner prescribed:</p> <p>10.1.5 Random Access procedure</p> <p>The random access procedure is characterized by:</p> <ul style="list-style-type: none"> <li>- Common procedure for FDD and TDD;</li> <li>- One procedure irrespective of cell size and the number of serving cells when CA is configured;</li> </ul> <p>The random access procedure is performed for the following events related to the PCell:</p> <ul style="list-style-type: none"> <li>- Initial access from RRC_IDLE;</li> <li>- RRC Connection Re-establishment procedure, as defined in TS 24.301 [20];</li> <li>- Handover, except for NB-IoT or when RACH-less HO is configured;</li> <li>- DL data arrival during RRC_CONNECTED requiring random access procedure: <ul style="list-style-type: none"> <li>- E.g. when UL synchronisation status is "non- synchronised".</li> </ul> </li> <li>- UL data arrival during RRC_CONNECTED requiring random access procedure: <ul style="list-style-type: none"> <li>- E.g. when UL synchronisation status is "non- synchronised" or there are no</li> </ul> </li> </ul>

	<p>PUCCH resources for SR available.</p> <ul style="list-style-type: none"> <li>- For positioning purpose during RRC_CONNECTED requiring random access procedure: <ul style="list-style-type: none"> <li>- E.g. when timing advance is needed for UE positioning.</li> </ul> </li> </ul> <p>...</p> <p>The claimed “first component carrier” is the “primary cell (PCell)” for which the random access procedure is performed.</p>
<p>performing a second random access procedure on at least a component carrier of the plurality of component carriers to establish uplink synchronization on the at least a component carrier, which comprises:</p>	<p>This limitation is present in the Accused Products. For example, 3GPP standard TS 36.300 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA) and Evolved Terrestrial Radio Access Network (E-UTRAN); Overall description (Release 11), v 11.14.0 (2015-12) describes performing a second random access procedure in the manner prescribed:</p> <p><b>10.1.5 Random Access procedure</b></p> <p>The random access procedure is characterized by:</p> <ul style="list-style-type: none"> <li>- Common procedure for FDD and TDD;</li> <li>- One procedure irrespective of cell size and the number of serving cells when CA is configured;</li> </ul> <p>The random access procedure is performed for the following events related to the PCell:</p> <ul style="list-style-type: none"> <li>- Initial access from RRC_IDLE;</li> </ul> <p>RRC Connection Re-establishment procedure, as defined in TS 24.301 [20];</p> <ul style="list-style-type: none"> <li>- Handover, except for NB-IoT or when RACH-less HO is configured;</li> <li>- DL data arrival during RRC_CONNECTED requiring random access procedure: <ul style="list-style-type: none"> <li>- E.g. when UL synchronisation status is "non- synchronised".</li> </ul> </li> <li>- UL data arrival during RRC_CONNECTED requiring random access procedure: <ul style="list-style-type: none"> <li>- E.g. when UL synchronisation status is "non- synchronised" or there are no PUCCH resources for SR available.</li> </ul> </li> <li>- For positioning purpose during RRC_CONNECTED requiring random access procedure: <ul style="list-style-type: none"> <li>- E.g. when timing advance is needed for UE positioning.</li> </ul> </li> </ul> <p>The random access procedure is also performed on a SCell to establish time alignment for the corresponding sTAG.</p> <p>...</p> <p><b>7.5 Carrier Aggregation</b></p>

	<p>...</p> <p>Depending on UE capabilities, Secondary Cells (SCells) can be configured to form together with the PCell a set of serving cells.</p> <p>The configured set of serving cells for a UE therefore always consists of one PCell and one or more SCells.</p> <p>...</p>
<p>receiving at least a random access preamble assigned by a network of the wireless communication system for the at least a component carrier;</p>	<p>This limitation is present in the Accused Products. For example, 3GPP standard TS 36.321 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (Release 11), v 11.6.0 (2015-03) describes receiving at least a random access preamble in the manner prescribed:</p> <p><b>5.1.1 Random Access Procedure initialization</b></p> <p>The Random Access procedure described in this subclause is initiated by a PDCCH order or by the MAC sublayer itself. Random Access procedure on an SCell shall only be initiated by a PDCCH order. If a UE receives a PDCCH transmission consistent with a PDCCH order [5] masked with its C-RNTI, and for a specific Serving Cell, the UE shall initiate a Random Access procedure on this Serving Cell. For Random Access on the PCell a PDCCH order or RRC optionally indicate the <i>ra-PreambleIndex</i> and the <i>ra-PRACH-MaskIndex</i>; and for Random Access on an SCell, the PDCCH order indicates the <i>ra- PreambleIndex</i> with a value different from 000000 and the <i>ra-PRACH-MaskIndex</i>.</p> <p><b>5.1.2 Random Access Resource selection</b></p> <p>The Random Access Resource selection procedure shall be performed as follows:</p> <ul style="list-style-type: none"> <li>- If <i>ra-PreambleIndex</i> (Random Access Preamble) and <i>ra-PRACH-MaskIndex</i> (PRACH Mask Index) have been explicitly signalled and <i>ra-PreambleIndex</i> is not 000000: <ul style="list-style-type: none"> <li>- the Random Access Preamble and the PRACH Mask Index are those explicitly signalled.</li> </ul> </li> </ul> <p>...</p> <p>the claimed “at least a random access preamble” is “the PDCCH order [that] indicates the <i>ra-PreambleIndex</i> and the <i>ra-PRACH-MaskIndex</i>.” For example, as shown above, section 5.1.2 states “<i>ra-PreambleIndex</i> (Random Access Preamble),” which indicates that the <i>ra- PreambleIndex</i> is in fact a “Random Access Preamble.”</p>
<p>sending at least a random access preamble message including the at least a random access</p>	<p>This limitation is present in the Accused Products. For example, 3GPP standard TS 36.321 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (Release 11), v 11.6.0 (2015-03) describes sending at least a random access preamble message in the manner prescribed:</p> <p>[2]</p> <p><b>5.1.2 Random Access Resource selection</b></p>

<p>preamble to the network; and</p>	<p>The Random Access Resource selection procedure shall be performed as follows:</p> <ul style="list-style-type: none"> <li>- If <math>ra\text{-PreambleIndex}</math> (Random Access Preamble) and <math>ra\text{-PRACH-MaskIndex}</math> (PRACH Mask Index) have been explicitly signalled and <math>ra\text{-PreambleIndex}</math> is not 000000: <ul style="list-style-type: none"> <li>- the Random Access Preamble and the PRACH Mask Index are those explicitly signalled.</li> </ul> </li> </ul> <p>else the Random Access Preamble shall be selected by the UE as follows:</p> <p style="text-align: center;">...</p> <p>proceed to the transmission of the Random Access Preamble (see subclause 5.1.3).</p> <p><b>5.1.3 Random Access Preamble transmission</b></p> <p>The random-access procedure shall be performed as follows:</p> <ul style="list-style-type: none"> <li>- set <code>PREAMBLE_RECEIVED_TARGET_POWER</code> to <math>preambleInitialReceivedTargetPower + \text{DELTA\_PREAMBLE} + (\text{PREAMBLE\_TRANSMISSION\_COUNTER} - 1) * powerRampingStep;</math></li> <li>- instruct the physical layer to transmit a preamble using the selected PRACH, corresponding RA- RNTI, preamble index and <code>PREAMBLE_RECEIVED_TARGET_POWER</code>.</li> </ul>
<p>receiving a random access response message on the first component carrier corresponding to the at least a random access preamble message from the network,</p>	<p>This limitation is present in the Accused Products. For example, 3GPP standard TS 36.321 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (Release 11), v 11.6.0 (2015-03) describes receiving a random access response message on the first component carrier in the manner prescribed:</p> <p><b>5.1.4 Random Access Response reception</b></p> <p>Once the Random Access Preamble is transmitted and regardless of the possible occurrence of a measurement gap, the UE shall monitor the PDCCH of the PCell for Random Access Response(s) identified by the RA-RNTI defined below, in the RA Response window which starts at the subframe that contains the end of the preamble transmission [7] plus three subframes and has length <math>ra\text{-ResponseWindowSize}</math> subframes. The RA-RNTI associated with the PRACH in which the Random Access Preamble is transmitted, is computed as:</p> <p style="text-align: center;">...</p> <p>The claimed “receiving a random access response message on the first component carrier” is “the UE shall monitor the PDCCH of the PCell for Random Access Response(s)”</p>
<p>wherein the random access response message includes at least a timing</p>	<p>This limitation is present in the Accused Products. For example, 3GPP standard TS 36.321 3GPP TSG RAN; Evolved Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (Release 11), v 11.6.0 (2015-03) describes the random access response message as prescribed by the claim limitation:</p>

<p>advance value determined by the network according to the at least a random access preamble message.</p>	<p><b>5.1.4 Random Access Response reception</b></p> <ul style="list-style-type: none"> <li>- if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble (see subclause 5.1.3), the UE shall: <ul style="list-style-type: none"> <li>- consider this Random Access Response reception successful and apply the following actions for the serving cell where the Random Access Preamble was transmitted: <ul style="list-style-type: none"> <li>- process the received Timing Advance Command (see subclause 5.2);</li> <li>- indicate the <i>preambleInitialReceivedTargetPower</i> and the amount of power ramping applied to the latest preamble transmission to lower layers (i.e., <math>(\text{PREAMBLE\_TRANSMISSION\_COUNT}_{\text{ER}} - 1) * \text{powerRampingStep}</math>);</li> </ul> </li> </ul> </li> </ul> <p><b>5.2 Maintenance of Uplink Time Alignment</b></p> <p>The UE has a configurable timer <i>timeAlignmentTimer</i> per TAG. The <i>timeAlignmentTimer</i> is used to control how long the UE considers the Serving Cells belonging to the associated TAG to be uplink time aligned [8].</p> <p>The UE shall:</p> <ul style="list-style-type: none"> <li>- when a Timing Advance Command MAC control element is received: <ul style="list-style-type: none"> <li>- apply the Timing Advance Command for the indicated TAG;</li> <li>- start or restart the <i>timeAlignmentTimer</i> associated with the indicated TAG.</li> </ul> </li> <li>- when a Timing Advance Command is received in a Random Access Response message for a serving cell belonging to a TAG: <ul style="list-style-type: none"> <li>- if the Random Access Preamble was not selected by UE MAC: <ul style="list-style-type: none"> <li>- apply the Timing Advance Command for this TAG;</li> </ul> </li> <li>- start or restart the <i>timeAlignmentTimer</i> associated with this TAG.</li> </ul> </li> </ul> <p>...</p> <p><b>6.1.3.5 Timing Advance Command MAC Control Element</b></p> <p>Timing Advance Command: This field indicates the index value TA (0, 1, 2... 63) used to control the amount of timing adjustment that UE has to apply (see subclause 4.2.3 of [2]).</p> <p><b>6.1.5 MAC PDU Random Access Response</b></p> <p>A MAC PDU consists of a MAC header and zero or more MAC Random Access Responses (MAC RAR) and optionally padding as described in figure 6.1.5-4.</p> <p>...</p> <p>A MAC RAR consists of the four fields R/Timing Advance Command/UL Grant/Temporary C-RNTI (as described in figure 6.1.5-3).</p>
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R	Timing Advance Command					Oct 1
	Timing Advance Command		UL Grant			Oct 2
		UL Grant				Oct 3
		UL Grant				Oct 4
		Temporary C-RNTI				Oct 5
		Temporary C-RNTI				Oct 6

Figure 6.1.5-3: MAC RAR

The claimed “timing advance value” is the “Timing Advance Command.”